

**Amendments to the Claims:**

This listing of claims will replace all prior versions, and listings, of claims in the application:

**Listing of Claims:**

1.     **(Original)** A method for quantitatively evaluating a graphite structure of a gray cast iron by an image analysis apparatus, characterized by comprising the steps of
  - analyzing a magnified image of the graphite structure, thereby extracting non-spherical graphite pieces of a particular size class contained in the graphite structure to calculate the number and areas of the non-spherical graphite pieces;
  - calculating a thick and thin degree expressing a degree of thickness of the non-spherical graphite pieces based on the number and the areas; and
  - outputting the number and the thick and thin degree of the non-spherical graphite pieces in combination as an evaluation result.
2.     **(Original)** The method for evaluating a graphite structure of a gray cast iron according to claim 1, characterized in that the magnified image for the image analyzing step is taken from a microscopic screen image of the graphite structure by an image pickup device.
3.     **(Currently Amended)** The method for evaluating a graphite structure of a gray cast iron according to claim 1 or 2, characterized in that the non-spherical graphite pieces are extracted to calculate the number thereof based on a diameter of a circle having an area equal to that of each graphite piece or on a maximum length of each graphite piece.
4.     **(Currently Amended)** The method for evaluating a graphite structure of a gray cast iron according to ~~any one of claims 1 to 3~~ claim 1, characterized in that the smallest graphite piece of the non-spherical graphite pieces extracted to calculate the number thereof has a size of an area equal to that of a circle having a diameter of 5  $\mu\text{m}$  or a maximum length of 10  $\mu\text{m}$ .
5.     **(Original)** The method for evaluating a graphite structure of a gray cast iron according to claim 4, characterized in that the smallest graphite piece of the non-spherical graphite pieces extracted to calculate the number thereof has a size of an area equal to that of a circle having a diameter of 5  $\mu\text{m}$ .

6. **(Currently Amended)** The method for evaluating a graphite structure of a gray cast iron according to ~~any one of claims 1 to 5~~ claim 1, characterized in that the magnified image is preprocessed to except and eliminate graphite pieces in contact with a frame of the magnified image before extracting the non-spherical graphite pieces of the particular size class, and

the number of the extracted non-spherical graphite pieces of a particular size class is corrected by the steps of

counting the graphite pieces to be excepted and eliminated;

classifying graphite pieces other than the graphite pieces to be excepted and eliminated into a plurality of size classes containing the particular size class, to count a number of the other graphite pieces of each size class; and

distributing the graphite pieces to be excepted and eliminated into the size classes proportionally based on a ratio between the numbers of the other graphite pieces, to add a number of the distributed graphite pieces to the numbers of the other graphite pieces.

7. **(Currently Amended)** The method for evaluating a graphite structure of a gray cast iron according to ~~any one of claims 1 to 6~~ claim 1, characterized in that the total area of the extracted non-spherical graphite pieces is divided by the total number thereof to obtain the thick and thin degree.

8. **(Currently Amended)** The method for evaluating a graphite structure of a gray cast iron according to ~~any one of claims 3 to 7~~ claim 3, characterized in that graphite pieces having a maximum length of 50  $\mu\text{m}$  or more and less than 150  $\mu\text{m}$  are selected from the extracted non-spherical graphite pieces, maximum lengths and areas of the selected graphite pieces are measured, and an area of a graphite piece having a maximum length of 100  $\mu\text{m}$  is calculated based on the measured data and divided by 100, to obtain the thick and thin degree of a representative graphite piece of the graphite structure.

9. **(Currently Amended)** A computer-readable recording medium storing a program for carrying out the steps recited in ~~any one of claims 1 to 8~~ claim 1.

10. **(Original)** A system for quantitatively evaluating a graphite structure of a gray cast iron by image analysis, characterized by comprising an image analysis unit, an image input unit for inputting a magnified image of the graphite structure into the image analysis unit, and a display unit for indicating an analysis result,

wherein the image analysis unit comprises a graphite piece number/area calculating unit for analyzing the magnified image of the graphite structure, thereby extracting non-spherical graphite pieces of a particular size class contained in the graphite structure to calculate the number and areas of the non-spherical graphite pieces, and a thick and thin degree calculating unit for calculating a thick and thin degree expressing a degree of thickness of the non-spherical graphite pieces based on the number and the areas, and

the number and the thick and thin degree of the non-spherical graphite pieces are visually indicated on the display unit in combination as an evaluation result.

11. **(Original)** The system for evaluating a graphite structure of a gray cast iron according to claim 10, characterized in that the smallest graphite piece of the non-spherical graphite pieces extracted to calculate the number thereof has a size of an area equal to that of a circle having a diameter of 5  $\mu\text{m}$ .

12. **(Currently Amended)** The system for evaluating a graphite structure of a gray cast iron according to claim 10 or 11, characterized in that the magnified image is preprocessed to except and eliminate graphite pieces in contact with a frame of the magnified image before extracting the non-spherical graphite pieces of the particular size class, and

the image analysis unit comprises a unit for correcting the number of the extracted non-spherical graphite pieces of the particular size class by the steps of counting the graphite pieces to be excepted and eliminated;

classifying graphite pieces other than the graphite pieces to be excepted and eliminated into a plurality of size classes containing the particular size class, to count a number of the other graphite pieces of each size class; and

distributing the graphite pieces to be excepted and eliminated into the size classes proportionally based on a ratio between the numbers of the other graphite pieces, to add a number of the distributed graphite pieces to the numbers of the other graphite pieces.

13. (Currently Amended) The system for evaluating a graphite structure of a gray cast iron according to claim 11 or 12, characterized in that graphite pieces having a maximum length of 50  $\mu\text{m}$  or more and less than 150  $\mu\text{m}$  are selected from the extracted non-spherical graphite pieces, maximum lengths and areas of the selected graphite pieces are measured, and an area of a graphite piece having a maximum length of 100  $\mu\text{m}$  is calculated based on the measured data and divided by 100, to obtain the thick and thin degree of a representative graphite piece of the graphite structure.